

REMARKS

After entry of this Amendment and Response, claims 15, 16, 18-22, and 24-28 will be pending. Claims 27 and 28 have been rewritten to recite all of the limitations of cancelled claim 1. Claims 15, 21, 27, and 28 have also been amended to clarify the scope of the claims. Support for the amendments may be found in the originally filed specification, e.g., in Figure 1C and related text. No new matter has been added.

Applicants confirm the election of Group II without traverse. The claims of Group I (claims 1-4, 6, 8-10, 12, 14, and 29-33) are hereby cancelled.

Rejection of claims under 35 USC § 102

Claims 15, 16, 18, 19, 27, and 28 are rejected as being anticipated by, or, in the alternative, as obvious under 35 U.S.C. § 103(a) in view of Winnerl et al. “Fast IR Si/SiGe Superlattice MSM Photodetectors with Buried CoSi₂ Contacts,” *Microelectronic Engineering*, Vol. 64, 2002, pages 205 – 209 (“Winnerl”). Winnerl appears to describe a structure including a buried CoSi₂ layer formed by ion implantation into a Si substrate. A SiGe/Si superlattice is grown thereover, sandwiched between a 120 nm thick Si buffer layer and a Si cap layer. See Figure 2 and related text on page 206.

The Examiner appears to consider the Si buffer layer as equivalent to the substrate recited in independent claim 15. But this interpretation of the Si buffer layer as being a substrate is contrary to the teachings of the Winnerl reference itself, which discloses forming the buffer layer on a Si(100) substrate. See page 206, second full paragraph. Winnerl, therefore, discloses a CoSi₂ layer formed in a substrate, and several layers, including a superlattice, disposed over the substrate.

Thus, Winnerl does not disclose a SiGe layer disposed over a first surface of a substrate and a stress engineering layer disposed over a second surface of the substrate, as required by independent claim 15. Moreover, Winnerl does not teach or suggest a surface of the stress engineering layer distal from the second surface of the substrate being exposed, as recited in amended claim 15. Similarly, Winnerl does not disclose forming a layer comprising Ge over a first surface of a substrate and forming a stress engineering layer over a second surface of the

substrate, with a surface of the stress engineering layer distal from the second surface of the substrate being exposed, as recited in amended claims 27 and 28.

Claims 21, 22, 24, 25, 27, and 28 are rejected as being anticipated by, or, in the alternative, as obvious under 35 U.S.C. § 103(a) in view of Winnerl et al., "MBE-growth of a Ge-CoSi₂-Si heterostructure for vertical metal-semiconductor-metal photodetectors," *Microelectronic Engineering* 60 (2002) 191-196 ("Winnerl 2"). Winnerl 2 appears to describe depositing a CoSi₂ layer on a Si(111) substrate. After annealing, a thin layer of Si is deposited on the structure, and thereafter depositing a monolayer of Sb and a Ge layer. *See Section 2 Growth process.*

The Examiner states that the resulting structure reads on independent claim 21, with the first surface being one part of the upper surface of the silicon wafer and the second surface being another part of the upper surface of the silicon wafer. Alternatively, the Examiner states that the thin layer of Si may be a substrate, with Ge on one surface and a stress engineering layer on the other surface.

But Winnerl2 does not teach or suggest a surface of the stress engineering layer distal from the second surface being exposed, with the second surface of the substrate being opposite the first surface of the substrate, as recited in amended claim 21, 27, and 28. Since amended claim 21, 27, and 28 explicitly require that the second surface of the substrate be opposite the first surface, the Examiner's first argument does not apply. Moreover, if one were to consider the alternative scenario described by the Examiner, Winnerl2 deposits a CoSi₂ layer on a Si(111) substrate and forms the thin layer of Si thereover. Thus, the CoSi₂ layer is sandwiched between a Si substrate and a Si layer, and does not have an exposed surface, as required by amended claims 21, 27, and 28.

Applicants submit that amended claims 15, 21, 27, and 28 and claims dependent therefrom, are patentable over the cited prior art for at least these reasons.

Rejection of claims under 35 USC § 103

Claims 15, 16, 18, 19, 21, 22, 24, 25, 27, and 28 are rejected under 35 U.S.C. § 103(a) as being obvious over U.S. Patent Publication No. 2003/0235931 to Wada (MIT9874)(“Wada”) in view of Cheng et al., “Effects of Stress on the Growth of TiSi₂ Thin Films on (001) Si,” *Applied Physics Letters*, Vol. 74, No. 10, 1999, pgs 1406-1408 (“Cheng”).

The instant patent application U.S. Serial No. 10/566,686 and Wada U.S. Patent Publication No. 2003/0235931, were, at the time the invention of U.S. Serial No. 10/566,686 was made, both owned by Massachusetts Institute of Technology. Wada, therefore, is disqualified under 35 U.S.C. § 103(c) as prior art in a rejection under 35 U.S.C. § 103(a).

Applicants submit that independent claims 15, 21, 27, 28 and claims dependent therefrom are patentable over the cited prior art for at least this reason.

Dependent claim 18 is rejected under 35 U.S.C. § 103(a) as being obvious over Winnerl in view of Glueck et al., CoSi₂ and TiSi₂ for Si/SiGe Heterodevices, *Thin Solid Films* 270 (1995) 549-554 (“Glueck”). Dependent claim 24 is rejected under 35 U.S.C. § 103(a) as being obvious over Winnerl2 in view of Glueck. Dependent claim 20 is rejected under 35 U.S.C. § 103(a) as being obvious over Winnerl in view of U.S. Patent No. 5,541,438 to Martin et al. (“Martin”). Dependent claim 26 is rejected under 35 U.S.C. § 103(a) as being obvious over Winnerl2 in view of Martin. Dependent claims 20 and 26 are rejected under 35 U.S.C. § 103(a) as being obvious over Wada in view of Cheng and Martin.

Applicants submit that these dependent claims are patentable for at least the reasons that independent claims 15 and 21, upon which they depend, are patentable.

CONCLUSION

No fees are believed necessary for filing this Amendment and Response. However, if any fees are due, the Director is hereby authorized to charge such fees to our Deposit Account No. 07-1700, under Order No. MIT-166.

If the Examiner believes that a telephone conversation with Applicants' attorney would expedite allowance of this application, the Examiner is cordially invited to call the undersigned attorney at (617) 570-1806.

Respectfully submitted,

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